I. CLAIM AMENDMENTS

Claims 1 and 20 have been amended to define with more particularity the features of an optical semiconductor device in accordance with the present invention. More specifically, claim 1 has been amended to recite the feature of "an energy level of the Γ-conduction band of at least a part of the electron-reflecting barrier being greater than an energy level of the Γ-conduction band of the p-doped cladding region".

Such feature in amended claim 1 is particularly useful as it leads to a reduction of electrons which pass through the electron-reflecting barrier to the p-doped cladding region. Support for such feature is found, for example, at page 23, line 12 to page 24, line 19; page 26, lines 4-16; and Figs. 4-11 of the present application.

Claim 20 has been amended to recite the feature that "the electron-reflecting layer contacts with the optical guiding region so that the Γ-conduction band of the optical guiding region is substantially degenerate with the X-conduction band of the electron-reflecting layer". Such feature leads to the prevention of the formation of a quantum well for X-electrons in the electron-reflecting layer for reflecting Γ-electrons, thereby preventing X-electrons from staying in the quantum well. Support for this feature is found at page 13, line 16 to page 14, line 3; page 16, line 17 to page 17, line 3, and Figs. 4-10 of the present application.

For reasons discussed more fully below in relation to the rejections, the cited art does not teach or suggest that "the electron-reflecting layer contacts with the optical guiding region so that the Γ-conduction band of the optical guiding region is substantially degenerate with the X-conduction band of the electron-reflecting layer" as recited in amended claim 1. Nor does the cited art teach or suggest that "the electron-reflecting layer contacts with the optical guiding region so that the Γ-conduction band of the optical guiding region is substantially degenerate with the X-conduction band of the electron-reflecting layer" as recited in amended claim 20.

claim 20 no esta arriba debajo de claim 1

II. REJECTION OF CLAIMS 1-28 UNDER 35 USC §102(b)

Claims 1-28 stand rejected under 35 USC §102(b) based on *Seko et al.* Withdrawal of the rejection is respectfully requested for at least the following reasons.

Claim 1, as noted above, has been amended to recite "an energy level of the Γ-conduction band of at least a part of the electron-reflecting barrier *being greater than* an energy level of the Γ-conduction band of the p-doped cladding region". *Seko et al.* does not teach or suggest such feature.

More specifically, an energy level of the Γ-conduction band of the multi-quantum barrier of *Seko et al.* (corresponding to the electron-reflecting barrier of claim 1) is *equal to or less than* an energy level of the Γ-conduction band of the cladding region of *Seko et al.* (corresponding to the p-doped cladding region of claim 1). See, e.g., Col. 2, lines 22-68 and Fig. 10 of *Seko et al.* Consequently, *Seko et al.* teaches the opposite of claim 1. Specifically, *Seko et al.* does not teach or suggest an energy level of the Γ-conduction band of at least a part of the electron-reflecting barrier *being greater than* an energy level of the Γ-conduction band of the p-doped cladding region.

Regarding claim 20, the claim has been amended to recite the feature that "the electron-reflecting layer contacts with the optical guiding region so that the Γ-conduction band of the optical guiding region is substantially degenerate with the X-conduction band of the electron-reflecting layer". *Seko et al.* also fails to teach or suggest this feature.

Specifically, it is necessary to contact the optical guiding region with the electron-reflecting layer in order to make the Γ-conduction band of the optical guiding region degenerate with the X-conduction band of the electron-reflecting layer. *Seko et al.*, to the contrary, teaches providing an active layer between the multi-quantum barrier (corresponding to the electron-reflecting layer of claim 20) and a superlattice cladding layer (corresponding to the optical guiding region of claim 20). See, e.g., Col. 6, line 61 to Col. 7, line 33; and Fig. 6 of *Seko et al.* Consequently, *Seko et al.* does not teach or suggest a Γ-conduction band of the optical guiding region degenerate with the X-conduction band of the electron-reflecting layer as recited in amended claim 20.

As a result, *Seko et al.* does not teach or suggest the invention of claims 1 and 20. Moreover, the remaining dependent claims may be distinguished over *Seko et al.* for at least the same reasons discussed above with respect to claims 1 and 20, as well

as for the particular features recited therein. Withdrawal of the rejection is respectfully requested.

III. INFORMATION DISCLOSURE STATEMENT

Filed herewith is an Information Disclosure Statement officially making of record the art cited in the search reports for the corresponding PCT and British applications.

IV. CONCLUSION

Accordingly, all claims 1-24 are believed to be allowable and the application is believed to be in condition for allowance. A prompt action to such end is earnestly solicited.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should a petition for an extension of time be necessary for the timely reply to the outstanding Office Action (or if such a petition has been made and an additional extension is necessary), petition is hereby made and the Commissioner is authorized to charge any fees (including additional claim fees) to Deposit Account No. 18-0988.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231.

March 27, 2003
DATE

APPENDIX

IN THE CLAIMS:

Claims 1 and 20 have been amended as follows:

1. (Amended) An optical semiconductor device comprising:

an active region; and

a p-doped cladding region disposed on one side of the active region;

wherein an electron-reflecting barrier is provided on the p-side of the active region for reflecting both Γ-electrons and X-electrons, an energy level of the Γ-conduction band of at least a part of the electron-reflecting barrier [providing a greater potential barrier to Γ-electrons than] being greater than an energy level of the Γ-conduction band of the p-doped cladding region.

20. (Amended) An optical semiconductor device comprising:

an optical guiding region;

an active region having at least one energy well, said active region being disposed in said optical guiding region; and

n-doped and p-doped cladding regions disposed on opposite sides of the optical guiding region;

wherein an electron-reflecting layer for reflecting Γ-electrons is provided at the p-side of the active region; and

wherein the electron-reflecting layer contacts with the optical guiding region so that the Γ-conduction band of the optical guiding region is substantially degenerate with the X-conduction band of the electron-reflecting layer.

Claims 25-28 have been canceled.